



HEX BUFFER/CONVERTERS: MMC 4049-INVERTING TYPE MMC 4050-NON-INVERTING TYPE

GENERAL DESCRIPTION

The MMC 4049 and the MMC 4050 are monolithic integrated circuits processed in standard Al-gate CMOS technology. The MMC 4049 and the MMC 4050 are inverting and non-inverting hex-buffers, respectively, and feature logic-level conversion using only one supply voltage (V_{DD}). The input-signal high level (V_{IH}) can exceed the V_{DD} supply voltage when these devices are used for logic level conversions. These devices are intended for use as CMOS to DTL/TTL converters and can drive directly two DTL/TTL loads ($V_{DD} = 5V$, $V_{OL} \leq 0.4V$, and $I_{O2} \geq 3.2mA$).

FEATURES

- High sink current for driving 2TTL loads
- High-to-low level logic conversion
- High sink and source current capability

ABSOLUTE MAXIMUM RATINGS

V_{DD}^*	Supply voltage: G and H types E and F types	-0.5 to	20	V
V_i	Input voltage	-0.5 to	18	V
I_i	DC input current (any one input)	-0.5 to	$V_{DD} + 0.5$	V
P_{tot}	Total power dissipation (per package)		± 10	mA
	Dissipation per output transistor for $T_A =$ full package-temperature range		200	mW
T_A	Operating temperature : G and H types E and F types	-55 to	125	°C
T_{stg}	Storage temperature	-40 to	85	°C
		-65 to	150	°C

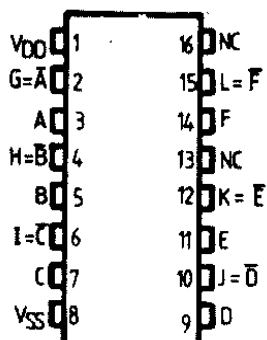
* All voltage values are referred to V_{SS} pin voltage

RECOMMENDED OPERATING CONDITIONS

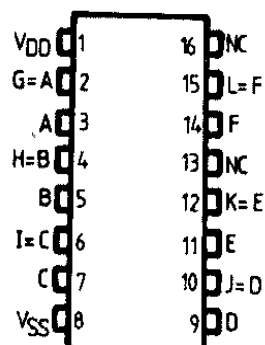
V_{DD}^*	Supply voltage: G and H types E and F types	3 to	18	V
V_i	Input voltage	3 to	15	V
T_A	Operating temperature : G and H types E and F types	0 to	V_{DD}	V
		-55 to	125	°C
		-40 to	85	°C

CONNECTION DIAGRAMS

MMC 4049



MMC 4050



STATIC ELECTRICAL CHARACTERISTICS

(over recommended operating conditions)

PARAMETER		TEST CONDITIONS			VALUES						UNIT	
		V _I (V)	V _O (V)	V _{DD} (V)	T _{LOW}		25°C			T _{HIGH}		
					min.	max.	min.	typ	max.	min.		max.
I _L Quiescent current	G, H types	0/5 0/10 0/15 0/20		5 10 15 20		1 2 4 20		0.02 0.02 0.02 0.04	1 2 4 20		30 60 120 600	μA
	E, F types	0/5 0/10 0/15		5 10 15		4 8 16		0.02 0.02 0.02	4 8 16		30 60 120	
V _{OH} Output high voltage		0/5 0/10 0/15		5 10 15	4.95 9.95 14.95		4.95 9.95 14.95			4.95 9.95 14.95		V
V _{OL} Output low voltage		5/0 10/0 15/0		5 10 15		0.05 0.05 0.05			0.05 0.05 0.05		0.05 0.05 0.05	V
V _{IH} Input high voltage (4049)			0.5 1 2	5 10 15	4 8 12		4 8 12			4 8 12		V
V _{IH} Input high voltage (4050)			4.5 9 13.5	5 10 15	3.5 7 11		3.5 7 11			3.5 7 11		V
V _{IL} Input low voltage (4049)			4.5 9 13	5 10 15		1 2 3			1 2 3		1 2 3	V
V _{IL} Input low voltage (4050)			0.5 1 1.5	5 10 15		1.5 3 4			1.5 3 4		1.5 3 4	V
I _{OH} Output drive current	G, H types	0/5 0/5 0/10 0/15	2.5 4.6 9.5 13.5	5 5 10 15	1.6 0.64 1.6 4.7		-1.25 -0.51 -1.30 -3.75	-6.4 -1.6 -3.6 -12		-0.9 -0.36 -0.9 -2.6		mA
	E, F types	0/5 0/5 0/10 0/15	2.5 4.6 9.5 13.5	5 5 10 15	1.5 0.61 1.5 4.5		-1.25 -0.51 -1.25 -3.75	-6.4 -1.6 -3.6 -12		-1 -0.42 -1 -3		
I _{OL} Output sink current	G, H types	0/5 0/10 0/15	0.4 0.5 1.5	5 10 15	3.75 10 30		3.2 8 24	6.4 16 48		2.2 5.6 17		μA
	E, F types	0/5 0/10 0/15	0.4 0.5 1.5	5 10 15	3.6 9.6 28		3.2 8 24	6.4 16 48		2.6 6.6 19		
I _{IH} /I _{IL} Input leakage current	G, H types	0/18		18		±0.1		±10 ⁻³	±0.1		±1	μA
	E, F types	0/15		15		±0.3		±10 ⁻³	±0.3		±1	
C _i Input capacitance	4049 4050	Any input						15 5	22.5 7.5			pF

* T_{LOW} = -55°C for G, H device; -40°C for E, F device* T_{HIGH} = +125°C for G, H device; +85°C for E, F device

The noise margin (only MMC 4050 type) for both „1“ and „0“ level is:

1V min. with V_{DD} = 5V2V min. with V_{DD} = 10V2.5V min. with V_{DD} = 15V

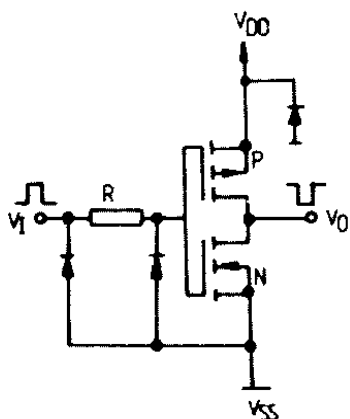
DYNAMIC ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ kohm}$, typical temperature coefficient for all V_{DD} values is $0.3\%/^\circ\text{C}$, all input rise and fall times = 20 ns).

PARAMETER	TEST CONDITIONS		VALUES			UNIT
	V_I (V)	V_{DD} (V)	min.	typ.	max.	
t_{PLH} Propagation delay time (4049)	5	5		60	120	ns
	10	10		32	65	
	10	5		45	90	
	15	15		25	50	
	15	5		45	90	
t_{PLH} Propagation delay time (4050)	5	5		70	140	ns
	10	10		40	80	
	10	5		45	90	
	15	15		30	60	
	15	5		40	80	
t_{PHL} Propagation delay time (4049)	5	5		32	65	ns
	10	10		20	40	
	10	5		15	30	
	15	15		15	30	
	15	5		10	20	
t_{PHL} Propagation delay time (4050)	5	5		55	110	ns
	10	10		22	55	
	10	5		50	100	
	15	15		15	30	
	15	5		50	100	
t_{TLH} Transition time	5	5		80	160	ns
	10	10		40	80	
	15	15		30	60	
t_{THL} Transition time	5	5		30	60	ns
	10	10		20	40	
	15	15		15	30	

SCHEMATIC DIAGRAMS

MMC 4049



MMC4050

